CLAIMS

1. A surface-coated cutting tool member whose hard coating layer exhibiting a superior wear resistance during a high speed cutting operation, the surface-coated cutting tool member comprising:

one of a tungsten carbide based cemented carbide substrate, a titanium carbonitride based cermet substrate, and a cubic boron nitride based sintered substrate; and

a hard coating layer of a nitride compound containing aluminum and titanium, which is formed on a surface of the substrate using a physical vapor deposition method at an overall average thickness of 1 to 15 μm, wherein

the hard coating layer has a component concentration profile in which maximum aluminum containing points (minimum titanium containing points) and minimum aluminum containing points (maximum titanium containing points) appear alternatingly and repeatedly at a predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained aluminum (or titanium) is continuously changed from the maximum aluminum containing points to the minimum aluminum containing points and from the minimum aluminum containing points to the maximum aluminum containing points,

the maximum aluminum containing points satisfy a composition formula of $(Al_XTi_{1-X})N$ (where X indicates an atomic ratio of 0.70 to 0.95), the minimum aluminum containing points satisfy a composition formula of $(Al_YTi_{1-Y})N$ (where Y indicates an atomic ratio of 0.40 to 0.65), and

a distance between one of the maximum aluminum containing points and adjacent one of the minimum aluminum containing points is from 0.01 to 0.1 μm.

2. A method for forming a hard coating layer exhibiting a superior wear resistance during a high speed cutting operation on a surface of a cutting tool, the method comprising:

mounting the cutting tool of at least one of a tungsten carbide based cemented carbide and a titanium carbonitride based cermet and a cubic boron nitride based sintered material on a turntable housed in an arc ion plating apparatus at a position radially away from a center axis of the turntable in a manner rotatable about an axis of the cutting tool;

producing a nitrogen gas atmosphere as the reaction atmosphere in the arc ion plating apparatus; and

generating arc discharge between a cathode electrode of an Al-Ti alloy for forming maximum aluminum containing points (minimum titanium containing points) and an anode electrode, and between another cathode electrode of a Ti-Al alloy for forming minimum aluminum containing points (maximum titanium containing points), which is disposed so as to oppose to the cathode electrode of an Al-Ti alloy with respect to the turntable, and another anode electrode, so that a hard coating layer having overall average thickness of 1 to 15 μm is formed, by a physical vapor deposition method, on the surface of the cutting tool being turned while rotating on the turntable about an axis of the cutting tool, wherein

the hard coating layer has a component concentration profile in which the maximum aluminum containing points (the minimum titanium containing points) and the minimum aluminum containing points (the maximum titanium containing points) appear alternatingly and repeatedly at a predetermined interval in a direction of thickness of the hard coating layer, and the amount of contained aluminum (or titanium) is continuously changed from the maximum aluminum containing points to the minimum aluminum containing points and from the minimum aluminum containing points to the maximum aluminum containing points,

the maximum aluminum containing points satisfy a composition formula of $(Al_XTi_{1-X})N$ (where X indicates an atomic ratio of 0.70 to 0.95), the minimum aluminum containing points satisfy a composition formula of $(Al_YTi_{1-Y})N$ (where Y indicates an atomic ratio of 0.40 to 0.65), and

a distance between one of the maximum aluminum containing points and adjacent one of the minimum aluminum containing points is from 0.01 to 0.1 μm.